



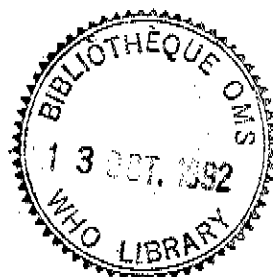
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Consultation on Mechanisms for Identifying Newly Emerging Chemical Health Hazards

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ABSTRACT

New monitoring strategies need to be designed to identify newly emerging hazards from chemicals in the environment, with the possibility of assessing and controlling risks. The WHO Regional Office for Europe held a consultation to review new scientific developments that could help identify new health problems, and to recommend mechanisms for the identification of emerging chemical hazards in order to set priorities for and make decisions on environmental risk management. Present monitoring systems were designed to ensure compliance with regulatory standards for a limited number of chemicals; the 15 participants at the consultation discussed the importance of developing these systems to build a second line of defence, to identify hazards that have not been predicted. The participants recommended the improvement of environmental and health monitoring through the coordination of activities, the harmonization of data recording processes, the use of a model predicting the distribution and fate of chemicals in the environment, and the better use of existing health data. They also urged the development of national monitoring strategies, the creation of an organization to ease international cooperation on the collection of data and the development of a communication system to produce a European early warning system.

TARGET 19

ENVIRONMENTAL HEALTH MANAGEMENT

By the year 2000, there should be effective management systems and resources in all Member States for putting policies on environment and health into practice.

KEYWORDS

HAZARDOUS SUBSTANCES
Environmental Monitoring - methods
Risk Management
Europe

Introduction

Because a wide range of environmental factors affect human health, preventing health hazards by protecting the environment has become a major concern in all countries of the European Region. Major efforts have undoubtedly been made and much progress has been achieved, but all the results are not yet equally satisfactory.

Monitoring strategies have so far been designed solely to control compliance with regulatory standards for a limited number of individual chemicals. They should be improved to allow the identification of newly emerging chemical hazards, on the basis of which new priorities for environmental risk management can be set. Additional legislation, inspection and environmental monitoring alone will not solve the growing environmental health problems in the Region. Not everything that can be measured should be monitored, and effective prevention depends primarily on having the appropriate machinery for the identification and assessment of health hazards, and for the verification of control measures. Therefore, a new monitoring strategy needs to be designed to identify newly emerging health problems, with the possibility of assessing and controlling developments in the environment, particularly unforeseen releases of toxic chemicals in routine use.

The present Consultation was organized by the WHO Regional Office for Europe with support from the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, and hosted by the Federal Health Office in Berlin. The participants comprised 15 experts from 12 countries, and 4 staff of the Regional Office. The purpose of the Consultation was to review new scientific developments that could help in identifying newly emerging health problems by a comprehensive analysis of current practice and the consideration of possible practical approaches, and to make recommendations on the identification of emerging chemical hazards in order to set priorities for and make appropriate decisions on environmental risk management. In addition, the participants discussed the possibility of developing a network of national focal points, international organizations and institutions that would be responsible for collection of data on health and ecological problems. Finally, the participants evaluated the possibility of establishing a European early warning system based on a network of national focal points responsible for the management of environmental risks to health.

Discussion

Over the last 30 years, growing awareness of the pollution of the environment with chemicals and the damage to health that can result has led all European countries to take action to control and prevent chemical hazards to health. Such action may be a response to events in which a chemical has already caused perceptible damage, for example, methyl mercury at Minamata, or it may be preventive, as in the requirement for the evaluation of the toxicity of new substances before marketing. Similar evaluation is gradually being applied to existing substances, multimedia exposure and exposure to mixtures of chemicals. Nevertheless, the evaluation of complex environmental exposures requires much more scientific development. Thus, existing methods should be better used to put in place new mechanisms to identify emergent health hazards that cannot be predicted by existing evaluation procedures. Such procedures will continue to be the first line of defence against chemical hazards, but they should be supplemented with a second line of defence to identify problems that, for whatever reason, have not been predicted.

Development of monitoring systems

The most effective way to develop a second line of defence is to build on existing systems. All European countries have chemical monitoring systems, whose main purpose is to ensure compliance with defined regulatory standards for a limited number of chemicals. If these systems are to identify emergent problems, the way in which they are implemented must change. Monitoring personnel must be alerted to the possibilities of new problems. They must receive information on the probable flow of chemicals through the systems or organisms that they monitor and on the associated possibility of problems, particularly diseases or other adverse effects of concern. Much of this information should be obtainable from industry or deduced from appropriate models for the distribution and fate of chemicals in the environment.

Chemical monitoring and effects monitoring have tended to be carried out separately, and the essential correlation between exposure and effect has often not been recorded. Thus, situations in which an effect is much more closely related to exposure than would have been predicted a priori may arise without being detected. Such situations may indicate emergent problems and monitoring teams should be alert to such possibilities.

If monitoring activities are to be coordinated, particularly at the international level, they must be systematic and unambiguous, and the data recording processes must be harmonized. The use of internationally agreed classifications, such as those of diseases and industrial operations associated with exposure to chemicals would facilitate this. In toxicology, the use of Chemical Abstracts Service (CAS) numbers for chemicals has proved invaluable in coping with the wide variety of trade names and nicknames used for the same substances.

In the near future, the European Community will introduce a regulation requiring data to be supplied on all chemicals marketed in amounts greater than 10 tonnes per annum. These data will be used to generate priority lists for risk assessment and possible control measures. A numerical system for prioritization, emphasizing mutagenic, carcinogenic and reproductive effects, has been proposed.

Ecotoxicological monitoring

Once a chemical has entered the natural environment, the high likelihood of movement from the source and transformation make it extremely difficult to set up an adequate monitoring system. Thus, some means of predicting what will happen to the chemical is essential to any regulatory action.

Various models have been developed to determine the potential distribution and fate of chemicals in the environment, but one of the simplest and most effective is the fugacity model. It permits the prediction of the possible partition of a chemical among different media (soil, water, air, etc.) and the identification of the main medium at risk, and is very good for evaluating and comparing molecules in a standardized environment. It requires data on molecular weight, water solubility, vapour pressure and the octanol/water partition coefficient. The use of this model can increase the effectiveness of monitoring and help in setting priorities. Moreover, if data on transformation rates are available, the model permits an estimation of overall environmental persistence.

Human health monitoring

The information obtained from the monitoring of human health can provide a basis for assessing public health priorities, planning and implementing disease prevention programmes, evaluating their success and identifying their deficiencies, and optimizing resource allocation. Various approaches have been used and each has its own potential, depending on the nature of the national health system and the purpose of health monitoring. In any approach, appropriate quality control is needed if the results obtained are to be useful.

Like other types of monitoring, human health monitoring must be carefully planned to be effective. Health effects are observed in individuals and quantifying individual exposures is not easy, particularly for effects such as cancer, when the disease may be detected many years after the exposure causing it. To identify emergent problems rapidly, there are advantages in looking at diseases or other effects that closely follow the cause. It is also necessary to look at diseases for which there is reason to suspect an environmental component. In addition to congenital malformations and cancer, these include respiratory diseases, such as chronic bronchitis and asthma, and other toxic or allergic effects such as those on the skin. In relating these to individual exposures, the variety of human activity must be considered, as this profoundly alters exposure.

Even in countries with good registers of mortality and types of morbidity, such as cancer, the linkage of such registers may be difficult in practice and could be improved. In all countries, data relevant to the identification of emerging hazards already exist in such registers or other databases, and it is essential to make as much use of these as possible. For example, existing data can be used to identify critical groups or geographical areas for further study.

As the source of many chemicals of concern, industry should recognize its responsibility to supply the information required to identify emergent problems. Physicians should play their part by reporting health effects that may result from chemical or other environmental exposures as soon as they become aware of them. In addition, health services staff should be aware of their responsibility to bring forward information on unexplained disease incidence that may be due to exposure to chemicals in the environment. Poison control centres have a major role both in alerting physicians and in collecting and transferring information. Care should be taken to ensure that information recording systems are harmonized as far as possible, with a view to subsequent linkage.

A European metadatabase, recording where data are available, would facilitate the linkage of information. A facility could also be provided to link small area studies in different countries relating to the same or similar chemical hazards. Again, quality control of the data is essential to such linkage, and must be ensured. People's concern for confidentiality of data must also be recognized.

The European Community is setting up an early warning system through a project, with the WHO Regional Office for Europe, called Care Telematics/Emergencies and the leader of the pilot project CITI2 in Paris. The system makes full use of modern telecommunications and initially focuses on poison control, communicable diseases and the facilitation of collaboration between crisis control centres.

Conclusions and recommendations

1. Newly emerging chemical hazards may be suspected from simple observation of, for example, the unexpected death of plants or animals in the natural environment. Nongovernmental organizations and local communities should be involved in collecting such observations.
 2. The ability to identify new chemical health hazards will reflect people's general level of education and awareness of these matters. With appropriate education, the general public can contribute to the observational monitoring of their environment. Thus, every step should be taken to facilitate education in chemical safety at all levels.
 3. Environmental monitoring can be made more sensitive to potential problems by incorporating predictive ecotoxicological modelling at the planning stage, to identify the environmental media most at risk.
 4. Unforeseen chemical hazards may arise in the development of land that has possibly been contaminated by waste or previous industrial or military activity. Special attention should be paid to such sites.
 5. Existing information should be used effectively in assessing the possibility of emergent chemical health hazards. Among the sources of information that may not have been sufficiently used are museum and military archives, which can cast light on past industrial or other contamination of a particular local environment. Veterinary records may also provide useful information.
 6. The reporting by general practitioners of all suspected or proven cases of illness caused by exposure to environmental chemicals might contribute to the recognition of new chemical hazards. Suspect cases may need additional investigation by specialized professionals. All notified cases should be collected, classified and analysed centrally to identify potential health hazards. To make the notification system efficient, general practitioners must receive proper training on environmental health hazards.
 7. In view of the well recognized need for and cost of monitoring the health of the population in relation to environmental factors, each country should develop its own strategy for such monitoring. Priority should be given to monitoring health effects known to be associated with locally significant environmental variables, particularly:
 - those with the greatest impact on health and those with the greatest potential for prevention; and
 - where there is an intention to take preventive measures.
- The health monitoring strategy should include a programme for routinely linking and analysing compiled data, even those collected primarily for other reasons, to identify environment-related trends or changes in the health of the population.
8. As exposure factors are often common to several countries or regions, an organization should be created to facilitate international cooperation in the collection of data from health monitoring. An important requirement for such cooperation is the development of a common system for quality control and the

assessment of the uncertainty of data. The development of such a system is urgent and should be given high priority. Present scientific methods for assessing toxicity have some shortcomings, for example, in revealing hazards related to long-term effects on the aging or developing nervous system. A second line of defence against this type of risk is therefore needed. A system for health monitoring to meet this need should be developed, possibly as a joint project of several countries.

9. Post-marketing surveillance of products containing chemicals of concern may provide a second line of defence against potential chemical hazards. Such surveillance could provide information on production, distribution, sale, use, human exposure, disposal and final environmental fate of chemicals especially important in international commerce. Related health surveillance could be very useful in detecting unpredictable health effects in human populations with particular genetic susceptibilities or hypersensitivities. The experience gained in the post-marketing surveillance of pharmaceuticals should help in designing a similar system for other chemicals.

10. Variations in disease incidence and mortality rates within a country are of more practical value than international comparisons. Hence, national programmes need to be developed to record mortality and morbidity data with close links to the localities in which they occur; that is, high-resolution geocoding and georeferencing. The programmes should also be compatible with confidentiality requirements.

11. Many epidemiological studies are hampered by the limitations of data obtained from small populations. Risk factors may be common to many countries and locations. Attempts should be made to provide a mechanism for linking local studies using small area statistics into multicentre studies for data pooling and meta-analysis.

12. Many states of health and risk factors can be monitored. It would be desirable to develop a minimum core subset of indicators (related to the targets for health for all). These could be used for monitoring through a local area network in each country, and could be linked to the information system of the WHO Regional Office for Europe through appropriate national focal points.

13. National issues of health and environment may have a highly local character. National programmes for health and environment information systems should be developed using the health and environment geographical information system (HEGIS) for prioritization and small area statistics techniques for risk assessment when possible. Ad hoc epidemiological investigation will remain the final approach.

14. The examination of small area health statistics around point sources of environmental pollution may be the starting point for identifying emerging chemical hazards. This requires the collection of high quality data on small areas. In countries without central personal identification numbers for the population, the health statistics that may be investigated are limited to data on mortality (by specific cause) and cancer incidence, and data collected in other special registers.

15. Another approach to the identification of emergent chemical health hazards is to look at the toxicological profile and use pattern of existing chemicals and to identify priority chemicals for in-depth investigation.

Monitoring data may also be considered. The proposed European Community regulation on existing chemicals would require data to be submitted on all chemicals marketed in the Community in amounts greater than 10 tonnes per year. This will allow Community priority lists to be compiled. Such priorities clearly need to be set, as there are far too many chemicals in the environment to monitor them all.

16. A proper system of communication between different administrative levels and different countries in Europe is needed to produce an early warning system for chemical hazards. To develop such a system improvements are needed in telecommunication, data management, reporting formats (with more standardization) and facilities for translation.

17. Cooperation between the national networks of poison control centres in the Region requires further improvement to ensure that available data are well used in the identification of emerging chemical health hazards. Systems such as that in the Care Telematics/Emergencies project may help improve communications between poison control centres.

18. A system should be established to support and promote the research required to improve and develop new approaches to the identification of emerging chemical hazards to health.